

# Design a Lunar Buggy

# **DESIGN** challenge

To design and build a model of a Lunar Buggy that will carry equipment and astronauts on the surface of the Moon and to determine the best slope of ramp for the rover to travel the farthest distance.

## **OBJECTIVE**

To demonstrate an understanding of the Engineering Design Process while utilizing each stage to successfully complete a team challenge.

# **PROCESS SKILLS**

Measuring, calculating, designing, evaluating

#### MATERIALS

General building supplies

Meter stick

Digital scale

Small plastic people (i.e. Lego®)

Plastic eggs

Pennies or washers ("cargo")

Wheels

Something to use as a ramp (preferably a flat surface that would enable the buggy to roll for 25 cm or more)

#### **STUDENT PAGES**

Design Challenge Ask, Imagine and Plan Experiment and Record Quality Assurance Form Fun with Engineering at Home





#### MOTIVATE

• Show the video about the Apollo 15 Lunar Rover on the Moon:

http://starchild.gsfc.nasa.gov/Videos/StarChild/space/rover2.avi

 Ask students to pay particular attention to the comments made about the difficulties in driving on the lunar surface.

## SET THE STAGE:

ASKIMAGINE &Plan

- Share the Design Challenge with the students
- Remind students to imagine solutions and draw their ideas first. All drawings should be approved before building.



## CREATE

- Challenge the teams to build their Lunar Buggies based on their designs. Remind them to keep within specifications.
- While each group is working, designate one or two students to create a ramp with a slope of 1 to 3 in which all groups will use to roll their buggies and record observations.

#### EXPERIMENT

- Students must test their designs down the ramp and record the distance travelled for each trial.
- Students should try a "Goldilocks" experiment and test various slopes to give the best distance travelled with their Lunar Buggy. What slope is too large? What slope is too much? What slope is just right? Have the students record their results.

#### **IMPROVE**

• Students *improve* their Lunar Buggy models based on results of the *experiment* phase.





## **CHALLENGE CLOSURE**

Engage the students in the following questions:

- Did the cargo mass make a difference in your Buggy's performance?
- How did the slope of the ramp affect your Buggy's performance?

#### **PREVIEWING NEXT SESSION**

Ask teams to bring back their Lunar Buggy models for use in next session's challenge. You may want to store them in the classroom or have the facilitator be responsible for their safe return next session.

Ask teams to think about potential landing pods during the next session. Tell students they will be building the landing pod out of the materials that have been available to them. The pod will be dropped from as high as possible (out a second story window, off a tall ladder, or from the top of a staircase).



To design and build a model of a Lunar Buggy that will carry equipment and astronauts on the surface of the Moon as well as determine the best slope of ramp for the rover to travel the farthest distance.

